

Silicon in PMCS

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11 January 2001



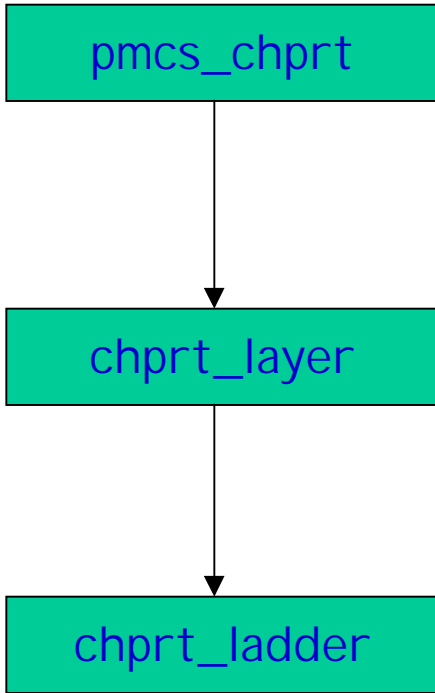
Motivation

Motivation is mainly in the context of Run 2b studies:

- ❑ Occupancy
- ❑ Acceptance

Clearly no effort to implement tracking algorithms...

Emphasis was on flexibility & ability to obtain quick results



Under control of a flag doSiDetails
in pmcs_chprt.rcp

Specifies a new RCP file to control
parameters

RCP file completely specifies a
silicon detector:

#layers

For each layer:

#barrels

Barrel length

Gap between barrels

#channels/ladder

ladder width

repeating azimuthal sectors

For each sector:

#ladders

Radius (cm), ϕ (rad), and tilt
angle w.r.t. normal (rad)

Limitations:

Only barrel geometries (no disks); only axial strips

No mis-alignments, multiple scattering

Infinitely thin planes; no charge deposition model



Implementation (cont'd)

Code:

- ❑ `pmcs_chprt::buildEvent()`, for each charged particle: invoke `intersect()` method of each `chprt_layer`
- ❑ This will search for all ladders intersected by the particle
 - ◆ Take into account “loopers” crossing a layer more than once
 - ◆ Some known imperfections (will not always find all ladders), should be very small effect
- ❑ For each hit ladder, calculate hit strip and increase its hit counter
- ❑ At end of event (in fact, in `pmcs_chprt::analyzeEvent`) clear hit counters
- ❑ Methods to interrogate ladders for occupancy, stored in n-tuple (in addition to #layers crossed by particles)
 - ◆ Requires new block in n-tuple (store maximum & avg occupancy per layer)



Implementation (cont'd)

Other details:

❑ [pmcs_util/pmcs_func.hpp](#):

- ◆ Added one parameter to the list of track parameters (charge sign) needed for calculations
- ◆ Added methods dealing with geometry
- ◆ NB: I think this set of track parameters is slightly inconsistent, in that it doesn't allow to switch the B-field direction

❑ [pmcs_util/rcp_tools.hpp](#):

- ◆ Added method to retrieve RCP object

❑ [pmcs/pmcsMergeKinePkg.hpp](#):

- ◆ Fixed the package so that minimum bias events can be overlaid on top of high- p_t events (simple fix: replace `auto_ptr` with `dO_Ref`)



Now working on a study of the effect of including silicon in the L1CTT

- ❑ Implement also CFT
- ❑ Change interface, to have a `chprt_SiLayer` and `chprt_CftLayer` derive from abstract `chprt_layer`
- ❑ Start with simple-minded CFT implementation
 - ◆ axial only
 - ◆ no staggered doublet layers but a single, infinitely thin cylinder
 - ◆ no charge deposition model
- ❑ Will try to isolate trigger-specific code as much as possible from other aspects (likely to take significant amount of CPU time, under control of RCP parameter)
- ❑ Nothing preventing more complete implementation (I hope)

Contributions welcome!